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Agricultural Research Service
Plant Pest Control Division
Federal Center Building
Hyattsville, Maryland 20781

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December 22, 1964

To: Regional Supervisors and PPC Supervisors in Charge

From: E. D. Burgess, Director

Subject: "A Review of Accidental Poisoning by Pesticides in the
USA in Recent Years"--Presentation by J. W. Gentry, Staff
Specialist, before the Engineer Entomology Services Training
Conference, Rock Island, Illinois, November 16, 1964

We are enclosing a copy of the subject paper by Mr. Gentry for your information. We believe that this paper is of more than passing interest since it is rather comprehensive in its coverage of the pesticide use problem as encountered nationwide.

E. D. Burgess

Enclosure

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A REVIEW OF ACCIDENTAL POISONING BY PESTICIDES
IN THE USA IN RECENT YEARS

Presentation by Mr. Joseph W. Gentry, Staff Specialist, Plant Pest Control Division, Agricultural Research Service, U.S. Department of Agriculture, before the Engineer Entomology Services Training Conference, Rock Island, Illinois, November 16, 1964.

The President's Science Advisory Committee Report of May 1963 emphasized the importance of safe use of pesticides. Although Federal, State, and private agencies were investigating and documenting pesticide accidents prior to this time, following release of the report, work in the field was generally strengthened. This was brought about by augmenting existing programs and by establishment of some additional programs in agencies concerned with pesticide use problems.

We will review the results of the work of some of these agencies in detail. This will give a general understanding of the nature of pesticide poisonings in the United States.

In the U.S. Department of Agriculture there are two Divisions active in the pesticide accident investigations field. One of these, the Pesticides Regulation Division, collects and utilizes reports and records of detrimental effects of pesticides in its operations. Copies of such reports become a permanent part of the registration jackets. The registration file of the particular material implicated is evaluated in relation to the information and revisions are considered when the evidence warrants such action.

Success for the Division's reports include direct correspondence, the National Clearing House for Poison Control Centers, Chemical Specialities Manufacturers Association Clipping Service, District of Columbia Red Cross Accident Report Service, the Food and Drug Administration, and direct investigation reports.

The last mentioned source is derived from a Division network involving 12 field stations throughout the country. This intensified approach to pesticide accident investigations was stepped-up in 1960 and further strengthened since that time. Today inspectors from the stations investigate all significant reports of pesticide accidents. Cases are carefully investigated and documented. Reports are supported by medical and other professional evidence when available. Official samples of materials involved are collected and analyzed where warranted.

The Pesticides Regulation accident file is divided into two major categories: human exposure and animal exposure. The animal group consists of pets, livestock and wildlife. For purposes of this discussion we will limit review to the human exposure file.

Table 1 shows poisonings and deaths associated with pesticides to 1963 according to the Division's records. About one-third of these reports occurred prior to 1957. Some are confirmed, some circumstantial, others

remote. They involve occupational and misuse accidents, attempts to commit suicide and suicide, and adventitious accidents. Adventitious is used to classify those accidents that involve unwitting misuse of an economic poisoning.

Table 1. POISONINGS AND DEATHS SUMMARIZED BY CLASS AND COMPOUND*

	<u>Total</u>	<u>Deaths</u>
Organic Phosphates	108	47
Chlorinated Hydrocarbons	40	8
Heavy Metals		
(Arsenic, Thallium)	71	35
Miscellaneous (30 compounds)	<u>92</u>	<u>29</u>
TOTAL	311	119

Table 2. DEATHS, OCCUPATIONAL AND ADVENTITIOUS, ASSOCIATED WITH PARATHION, ARSENIC AND THALLIUM*

	<u>Occupational</u>	<u>Adventitious</u>	
		<u>Adult</u>	<u>Child</u>
Parathion	23	0	13
Arsenic	0	8	10
Thallium	0	6	11

The human cases are divided into the categories of aviation, skin absorption, inhalation, oral and miscellaneous. Examination of records from 1960-63 shows the following: of 14 cases attributed to inhalation, one resulted in death; while of 30 attributed to oral intake, 11 resulted in death (5 from arsenic compounds, including 2 suicides). Incidentally, warfarin does not seem to be a very effective suicide implement. There are cases where $\frac{1}{4}$ pound, $\frac{1}{2}$ pound, and 5 pounds were eaten without desired effects. Of 19 cases attributed to skin absorption, 4 resulted in death. Nine miscellaneous cases were reported, including two deaths. Aviation reports generally involved occupational mishaps. Excluding aviation, among 72 cases documented almost $\frac{1}{2}$ involved children.

Another U.S. Department of Agriculture organization conducting pesticide accident investigations is the Plant Pest Control Division. The major objective of this Division's work in the field is to promote safety in pesticide use through development and distribution of authentic information on accidents involving agricultural pesticides. This program, which was started in late 1963, is closely coordinated with that of the Pesticides Regulation Division which we just reviewed. By utilizing an existing nationwide organization Plant Pest Control is able to undertake an investigation anywhere in the United States as soon as it is reported to national headquarters.

*Economic Poison Surveillance Records to 1963.

When it is decided that a report warrants an investigation, a painstaking exploration is made using detailed guidelines.

Each report is supported by direct observations, medical reports, witness statements and other valid data. Such a report together with exhibits may run into more than 100 pages and require several days work.

Thus far this year, Plant Pest Control has prepared 13 reports on agricultural accidents. Except in special cases, such as legal involvement or inability to establish authenticity, each case is summarized and distributed over a mailing list. A short review of cases investigated will give a profile of the current agricultural pesticide accident situation in the United States.

Accidents Involving Man:

1. A dragline operator at a sanitary fill in Orange County, Florida, became heavily contaminated while burying parathion containers. He did not wear protective equipment and was consequently severely poisoned.
2. An occupational case was reported from Del Ray, Florida, involving parathion. An operator was spraying and accidentally spilled some of the material on his clothing. He did not change clothes or bathe.
3. Exposure to an empty container of parathion caused the death of a 3-year-old boy in Minnesota.
4. Parathion was attributed as the cause of death of a 2-year-old boy in Palm Beach County, Florida. The boy and a 5-year-old playmate apparently became contaminated while playing with a spray gun. The other child recovered.
5. A spray operator in southern Alameda County, California, died after exposure to mevinphos (Phosdrin). He became contaminated while working alone at night. Safety precautions were not followed.
6. A 4-year-old boy in Tampa, Florida, was poisoned by parathion. He was hospitalized and apparently has recovered. The child was reported to have been playing in empty steel drums. Analysis of residues from the drums showed 60 percent parathion.
7. A 17-year-old worker became ill after sleeping on sacks of seed-grain treated with ceresan in a garage in the vicinity of Walsh, Colorado.
8. Parathion was responsible for the death of a 3-year-old boy in Miami, Florida. The father of the boy had unwittingly purchased some powder in an unmarked container for roach control. Active ingredient was parathion. The child was poisoned through contact or ingestion.

Accidents Involving Domestic Animals:

1. Cattle broke into an abandoned building in Geyser, Montana, and fed on old grasshopper bait, arsenic and bran, that had been stored there since the 1930's. Thirty-eight head died as a result.
2. Mormon cricket bait, grain impregnated with aldrin, caused death of chickens and several head of cattle in Idaho. The grain had been purchased at an auction yard. The warning tags had been removed prior to sale.
3. Contamination of a grazing area by sodium arsenite was believed responsible for the death of several head of cattle at Menahga, Minnesota. Again, grasshopper bait stored in an old building since 1938 or 1939 was involved. The building had since deteriorated and heavy spring rains may have washed the sodium arsenite onto the grazing area.
4. Rodent bait containing 1080, also known as sodium fluoroacetate, was responsible for the death of 4 head of cattle in Bonner County, Idaho. The material was apparently acquired in 1956. Since that time through change of ownership the bait had lost its identity and the bags had been thrown on a trash pile where the cattle could reach it.
5. An excessive application of lindane spray for fly and lice control caused the death of 5 head of cattle in Beadle County, South Dakota.
6. An over application of dichlorvos (DDVP) for fly control may have been responsible for illness of a herd of cattle in Fruita, Colorado. The pesticide was also found to be contaminated with aldrin.
7. Thirteen cattle died at Iyerly, Georgia, apparently as a result of overtreatment with a formulation of Lethane.
8. Eighty dairy cattle became ill in Florence, Colorado, after having been sprayed for fly control with a solution containing DDVP. Presumably, an excessive amount had been applied due to improper mixing of the solution.
9. Two steers were lost in Minnesota in August from diazinon spray. The farmer had not noticed the label contained the warning "DO NOT USE ON ANIMALS."

The work of the Plant Pest Control Division in pesticide accidents discussed here is limited to man and domestic animals; however, the Division also investigates significant fish kills and wildlife losses wherever pesticides are implicated.

You are familiar with Poison Control Centers operating throughout the country. The first of these centers was established in Chicago in 1953. By 1963 there were about 500 centers in operation. Objectives of this program include (1) accumulation of information on products and treatment necessary for ingestion, (2) improvement of treatment facilities so that treatment may be expedited, (3) establishment of a reporting system on cause of accidental ingestions so that preventive programs might be developed.

This work is coordinated through a National Clearinghouse for Poison Control Centers in the U. S. Public Health Service. About one-half of the centers report to the clearinghouse. In 1961-62, the clearinghouse received 96,000 reports of ingestion incidents. Eighty-seven percent of these were classified as accidents, and 86 percent involved children under five years of age. The top five classes of substances implicated in this age group were aspirin, bleach, soaps and detergents, insecticides, and vitamins and iron preparations. So you see again, insecticides are an important source of poisoning in children, particularly the very young. In this study, insecticides were ingested more frequently by children under one year of age than any other category of substances. In cases adequately followed up it was found that over two-thirds of all ingestions involved substances that were not in their customary places of storage.

Another analysis issued by the clearinghouse showed the insecticides most frequently ingested by children were: Gator Roach Hives, Black Flag, Real-Kill, Raid, Harris Famous Roach Tablets, 612 repellent, Lilly's Ant Cup. Although the Food and Drug Administration does not have a formal program on pesticide poisonings, it conducts investigations in this area in connection with regular operations. Contact is maintained with national and local sources, particularly the Poison Control Centers. Any significant report received is screened in order to determine if labeling is at fault or misuse is involved.

Among the States most active in human poisoning studies are Florida and California. The Florida State Board of Health in its Accident Prevention Program documents human poisonings, much in the same manner as the National Clearinghouse for Poison Control Centers. The main source of information for this work is from hospital reports. Table 3 shows classification of poisonings in Florida for the year 1963.

Table 3. POISONINGS IN FLORIDA - 1963

36%	--	Internal medicine, excluding aspirin
20%	--	Aspirin and other salicylates
11%	--	Insecticide, rodenticide, herbicide
11%	--	Cleaning polish, sanitizing agent, etc.
5%	--	External medicine, menthol
5%	--	Kerosene
3%	--	Petroleum, excluding kerosene
3%	--	Plant
6%	--	Other
Total poisonings -- 4,985		
1,036 adults -- 3,849 children		

In the last half of 1963, internal medication continued to account for the largest number of accidental poisonings in Florida. Aspirin, with a total of 614 cases, was the product accounting for the most cases during this period. In comparison, pesticides accounted for 317 cases. Of a total of 2,990 cases reported during the 6 months' interval, 1,797 (or 60 percent) were children under five. Previous Florida reports show that about 62 percent of total poisonings occur in this age group.

In visiting the homes of 3,000 children treated for accidental poisonings during the year, public health nurses found that in nearly every case the product was not in its original container or not in its usual place. Furniture polish in teacups on coffee tables or kerosene in soft drink bottles on kitchen tables are common examples. In the cases of aspirin or other internal medications, it was found that the child mistook the products for candy.

Since 1950, the California State Department of Public Health has been studying the human and environmental effects of agricultural pesticides. The Bureau of Occupational Health has had primary responsibility for the work. This Bureau issues a yearly report on "Occupational Diseases in California Attributed to Pesticides and Other Agricultural Chemicals."

Under California law each physician who attends an injured employee and each employer of such a worker is required to file a report when disability lasts beyond the day of injury or requires medical services. These reports furnish the basis for the Bureau's pesticide poisoning studies and covers about two-thirds of the persons working in agriculture. These are workers covered by California workmen's compensation law.

The annual reports of the Bureau of Occupational Health are acknowledged to be one of the few, and one of the best, sources of collected data about the human health effects of agricultural chemicals. A brief look at the statistics compiled by this organization will afford a gross picture of the role of agricultural pesticides as a health problem. These figures were taken from the 1962 report, the last issue available.

From 1951 to 1962 there were 26 occupational fatalities in California attributed to agricultural chemicals. During this period, 19 other adults and 70 children died in California, making a total of 115 deaths from causes attributed to pesticides and agricultural chemicals. In 1962 there were 827 reports involving pesticides, 9 percent less than 1961. About 22 percent of the 827 reports implicated the organic phosphates, herbicides 8 percent, chlorinated hydrocarbons 8 percent, fertilizers 6 percent. It should be pointed out, however, that the chemical was not specified in 40 percent of the cases. Nearly 60 percent of all reports involved skin conditions and 60 percent of reports involved farm laborers.

Summary

The current investigations and results on some of the principal agencies engaged in pesticide poisoning studies have been reviewed. In many cases pesticide poisonings are included in the broad field of human poisoning of all kinds. This gives more meaning to the pesticide cases, however, as their importance can be judged on a comparative basis. We have seen where most of the pesticide poisoning cases occur: in young children; in ignorant, thoughtless or careless adults. The U. S. Public Health Service states that "in every case of human death from pesticides, the cause has been accidental misuse of a chemical poison."

Several U.S. Department of Agriculture agencies were recently asked to list the 10 most difficult questions to answer in the current pesticide controversy. Two of the 10 were:

1. What assurance does the public health have that pesticides are being used in accordance with the labels?
2. How can a program be developed and implemented to educate users of pesticides to follow the label?

Within these questions lie the answers to much of the problem of pesticide poisoning in humans as well as in other areas of the pesticide use field.

It is reassuring, however, that concerted efforts are being made to impress upon the public and other users of pesticides the importance of pesticide safety. Federal, State and private agencies are using motion pictures, television, radio, newspapers, posters, bulletins and other information media in a vigorous campaign to disseminate information on the subject. This increased emphasis on safety is backed up by agencies having responsibility in the pesticide use field through positive actions, such as increased attention to registration and labeling of products, to pest control methods and practices, and to the effects of pesticides on the total environment.

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